HOW SHALL WE MAKE OUR

Homes Healthy?

BY

Benjamin J. Portugaloff, M. D.

TRANSLATED FROM THE RUSSIAN.

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Chicago,
World's Columbian Exposition,
1893.

THE

Sanitation of the World

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How shall we make our homes healthy?

Whenever an epidemic disease gets hold, within a short space of time, of the whole of our globe, from Baku to Paris, from Aden to Peking, it is, in first instance, a proof that Mercury, Mars, Venus and Bacchus have done their utmost to infect the beautiful Earth. At times only Prometheus succeeds in clearing with his salutary fire the filth that has been heaped by man, and the plague then leaves the field. We do not know how many inhabitants there were on the face of the globe when the Gods reigned on Olympus, but as regards the present century we know that in 1810 the entire population of the world numbered 682,000,000 and toward 1890 their number increased 2½ times, amounting now to 1,562,000,000. Pretty crowded it gets, and there have somewhere accumulated piles of garbage and all kind of dirt and mud.

A few centuries ago a huge desert was stretching where now is our Russ: and now a smell as if of myriads of pinched bed bugs is spread all over European Russia. Then again the movement of population is not the same as before. When after the discovery of America by Columbus Magellan undertook his journey around the world, he completed it with incredible heroism and efforts and spent in it over 3½ years. Now you start from Liverpool on a luxurious steamer and make the trip with the highest comfort in 64 days. Exactly with the same speed the whole globe can be run over by any epidemics, for the soil is everywhere prepared for the infection, fattened by garbage heaped for centuries and by the dirtiness of all living mankind. Still it was not always so. At the dawn of history mankind thronged along the banks of Nile

and Egypt was the first to work out some ideas of cleanliness and notions of hygiene, which were borrowed from them by other peoples. But Egypt was saved from accumulation of filth by Nile. The inhabitants heaped mountains of refuse and thresh, but the river flooding the banks cleaned off the country. In another part of the old continent, in the city of Nineveh, whose very memory was centuries ago lost by history, the water supply was very intelligently cared for; every chamber of the King's palace was connected by pipes with the central reservoir and water was everywhere in abundance. The celebrated sewer and acqueducts constructed in Rome by Tarquinius, have remained till the present day, notwithstanding allthe vicissitudes of twenty five centuries' history, the greatest work of public sanitation bequeathed to us by the ancient world. Five centuries B. C. sanitary officers, ædiles, were elected to take charge of fhe cleaning of every town. The first triumvirs constructed aqueducts, baths, gymnasiums, cared for the cleanliness of the streets and appointed medical officers. Their sanitary institutions are model even from a modern point of view. Toward the epoch of the last cæsars, however all sanitary institutions fell into a state of decay. The mediaeval period from Atilla till Columbus was an epoch of asceticism, as wall as of accumulation of ordures.

Leprosy broke out first about the IV century and during the crusades took enormous dimensions; leprosories, hospitals for the lepers, were established during the XII century all over Europe. The people were overcome with superstitious fear, which kept them from approaching the unfortunate. Many places were overwhelmed by dirt, which necessitated a series of sanitary regulations. The British Islands were in special need of relief. In the XIII century stringent regulations regarding cleanliness were enacted and measures were taken to improve the condition of slaughter-houses, and public and communal roads. So dirty was the Thames at the time that it became urgent to put a stop to that evil. After the close of the monasteries hundreds of paupers and cripples were thrown on the streets; severe laws were enacted against beggars. The filthy dens of the unfortunate poor wretches became the hearth of the plague of 1665, which carried away over 150,000 human beings in London alone. But suddenly appeared Prometheus in full array—a terrible fire destroyed three

fourths of the city and by this peculiar method of disinfection the capital was saved from the plague. Again all was forgotten. The practice of heaping ordures was resumed. Now a helping hand was lent by the salutary cholera. The people were awakened to the awful condition of their habitations due to a great extent to their own carelessness. During the reign of William IV a good deal of red tape was developed by the officers of the government. But Queen Victoria's government is earnestly working on problems of public health and has shown itself quite liberal in its appropriations for public improvements, but much still remains to be done.

One who comes to consider modern Europe from the impartial standpoint of hygiene, feels alarmed over its gloomy future. In the beginning of the present century there was plenty of room in Europe, and life was more regular; now the population is increasing day by day, and the sanitary condition grows from bad to worse. The soil of all inhabited Europe is fouled. Pure water is utterly scarce. The rivers have become receptacles for all the ordures of the towns. No man of culture would risk to drink water from the Seine, from the Thames, from the Spree, or even from the Danube in Vienna. Of course, no one would use drinking water from the Moscow river, no more than from Ganges which, by a religious superstition has been made a burial place for the Hindoo. The corpses rotting in the river convert its water into a tincture of cholera bacilli. Still, following Surgeon-General Moore's report, we learn that the sanitary condition of the towns and villages of India favorably compares with that of Turkey, Persia, or China. The condition of the latter may well be imagined. The marshes around the mouths of Ganges and Brahmaputra never dry, the soil is ever damp; the air is poisoned with the ill smell of the stagnant water. Right here is the birth place of the cholera. When the season of rain comes, the cholera starts its route over the vales and plains of the country. It would not stop before the highest mountains, unless man is barred by them in his travels. It climbs as high as 3,000 feet between Shiraz and Ispahan and even as high as 7,000 feet on the Himmalays. But here we wish to call attention to one remarkable fact: never has any one met the cholera in the dry prairies of Asia or Africa. Not a single instance is known of

the cholera being brought to Syria or Egypt by the caravans crossing the vast prairies and deserts. In this fact we find a suggestion as to the most efficient weapons in our struggle against the epidemics. Damp and marshy grounds must be drained and cleanliness must be maintaned by all means. This is more essential than all the quarantines and other artificial measures, which result in nothing but an Immense amount of bureaucratic red tape. Last year the attention of the whole world was called by the ravages of the cholera in Hamburg. There is an excellent system of drainage in Hamburg, by which all the ordures of a half million population are promptly carried away into the mouths of the Elbe, near by the sea. There is a fair aqueduct, furnishing the whole city with drinking water taken from the same river, quite a distance up the place where the refuse is let out into the river.

Whence then did the cholera come? Everything is all right during the low ebb: all the refuse has been carried away into the sea, but with the high tide the sea returns to the city all that it has received, and right to the place where the aqueduct takes the water from. Thus the Hamburgers drink their own excreta We should wonder if there were no cholera there.

The same is the case with the Thames. Owing to the accumulation of ordures, to the dirtiness of the soil and rivers, all the parts of the world are well provided with their own infectious maladies and are all the time treating one another: Europe—with typhus, Asia — with cholera, Africa — with malaria, America — with yellow fever. But Europe is the hardest up, as its population is effeminated by civilization, while the filth remains the same as in the olden times.

The civilized life of the Europeans has become too complex for the primitive systems of drainage, it stands in need of sanitary improvements of a higher quality. Whoever has visited the large European centres, Paris, Vienna, Berlin, not to speak of the primitively dirty Moscow, and has taken the trouble to go farther than the fashionable parts of the city, will testify to the dreadful dirty condition of the so called slums. Drainage alone is powerless here. Moreover, the drainage system is apt to carry away no more then 10 per cent of all the garbage; all slab, kitchen matter, street dung etc., in a word 20 per cent of the refuse is carried out of the city by horses. Still this is far from being a thorough

cleaning; the greater part of the refuse rots on the ground, infects the soil or dries and spreads in the air as dust and is then breathed by the inhabitants of fhe city. Then comes the cholera to remind the modern man of the necessity of keeping his habitations clean. Cholera has thus become the most powerful agent of sanitary progress. But amidst the high achievements of European civilization cholera is a shame, a disgrace to man.

But the day is coming when man will shake off the disgraceful yoke of ordures and clean himself and everything surrounding him. England has set the example. The English have devised a very practical way to get rid of refuse and filth. In former days they also used it as manure for their fields, but artificial chemical fertilizers subsequently proved more economical and fruitful; the demand for refuse ceased and it became necessary to dispose of it somehow or other.

Need brings forth genius precisely as war makes heroes. Freier invented and constructed a stove of a peculiar system which destroys all refuse and garbage. The stove was for the first time put in operation in Birmingham in 1876. The example was followed by Leeds and Bedford. Last year 40 English towns had such burners in operation. Now, how does it work? It can burn up all the garbage of a city, solid as well as liquid.

Freier's stove burns all house thresh, *e. g.* paper, straw, wood, rags and kitchen matter, and all kind of street and market garbage. In some towns this stove burns confiscated meat and also excreta, if they contain no more than 40 per cent of water, and even such garbage in which there is a considerable admixture of inorganic matter. This stove is Prometheus himself! The God of Fire, benefactor of the human race, reigns over there. The construction of this stove, termed *cell*, is very simple. Sunday night a small quantity of coal if put in the stove, underneath the garbage. The fire lasts by itself until all the garbage is burnt. The stove is a metal one and is placed in a brick building with high pipes carrying away the smoke and gases. The stove may be fixed in the most popalated districts of the city, there being absolutely no danger of fire. Appliances are provided for keeping away smoke and harmful gases, and the tenants of the neighboring houses do not complain, do not know even, of the existence of the stove. The cost of its construction amounts

to from £ 300 to £ 1,500, according to its size. It burns from 24 to 35 tons a week and the expense amounts to 1 s. per ton. Very little service is required: one workman can attend to several stoves in the same building. Moreover the expense is made up by the income derived from it. The ashes make a good manure.

At the same time the cell generates an enormous power acting as a motor in aqueducts, elevators and electrical machines. In Southampton the burner provides with power 250 electrical machines. It is clear that the burner is the best guard of public health. It crushes all germs of infectious disease, and prevents the heaping of slab and the dirtying of the soil.

Why then not make use of this beneficent appliance? We might say, modifying the words of Henry IV, that the welfare of our race will be secured not only then when every peasant will be provided with chicken, but when every hamlet will have such a stove for the burning of refuse. But the burning of refuse is well-nigh impossible without separating solid matter from water. For this purpose all modern systems of drainage are provided with filters, basins, etc., but all these devices do not serve the purpose. The best and the cheapest is the mechanical method. The Nadiein system apparatus, awarded a medal at the World's Columbian Exposition (see Appendix), enables to attain this end even where the water closet system prevails. Then the solid refuse and fecal matters can be burned.

To conclude with, let us say that an ideal state we are aspiring to is that which strives to do away with epidemics at all. Their prevalence is a sign of a low state of culture and public health. When cholera paid her first visit to England in 1831, it carried away 52,000 victims. In 1866, it struck only 18,000, while on the continent it killed a full million. These results were due to the improved state of public sanitation in England. Our globe needs cleaning, and sanitation. In Prometheus, the incarnation of fire, we shall find the best and surest agent for this end. But we can not acquiesce in it, we must go ahead and invent ever new and better and wider-reaching improvements. Civilization and her two smart daughters, Science and Hygiene, will guide us along the infallible ways leading to the achievement of these ends.

Golden Medal and Great Honorary Prize, Hygienic Exposition, LONDON, 1892.

Honorary Prize, Universal Exposition, PARIS, 1889.

Golden Medal and Great Honorary Prize, Hygienic Exposition, BRUSSELS, 1892.

THE WORKING OF THE APPARATUS CAN BE SEEN IN THE DEPARTMENT OF HYGIENE, ANTHROPOLOGICAL BUILDING, WORLD'S COLUMBIAN EXPOSITION.

The working of the apparatus is explained in the descriptions accompanying the drawings. What is desired here, is to point out the service done by the apparatus as regards hygiene and economy, the way in which the sanitation of towns and houses is attained wherever the Nadieïn system apparatus are applied, and also the decreased expense of water, which is doubtless not unimportant a consideration in municipal economy. Furthermore we beg to call attention to the fact that by the use of the Nadieïn apparatus the cost of canalization in cities is considerably lessened by dispensing with the construction of modern canalization works implying the use of expensive materials. Where the Nadieïn apparatus is applied, the water separated by it, being almost pure and not infected by fecal matter and other refuse, can be run immediately into rivers and canals. Wooden pipes can be used, when cheap, and laid down in the ground at a less incline than usual. Solid refuse, such as fecal matter and kitchen slab, separated by the apparatus and converted into manure, can be utilized in agriculture or burnt in common stores, which efficiently prevents the spreading of infectious diseases by such matters.

The work of all Nadieïn system apparatus is automatic. Every drop of water [illegible] from the hydrant is utilized, the water flowing into the urinal *H* is not let out until it has washed the walls of the same. Then the water, running from the basin through the Nadieïn system syphon *K*, mixes with the urine and oxygen, by which the organic elements of the former are oxidized, whereafter this water runs into the water closets and thus the latter are more thoroughly washed. The water running from the baths is also directed into the waterclosets. All water running from the house down through the pipes *D* and *O* of the apparatus and therefrom through the chambers *K* and *J*, ventilates the waterclosets as well as the rooms. Then flowing from the house into the pit *d* it fills the receptacle, wherefrom it pours in a stream through the syphon *g* into the sewer *h* thus thoroughly washing the latter. The same water flowing down the parabolic separator *L* brings into motion the drum *r* hanging over the box *H* and after disinfecting the feces gathered in the box *P*, converts them into manure.

As the Nadieïn system apparatus are not connected immediately with the underground sewers, therefore the rooms are proof against foetid gases entering from sewers, which cannot be avoided under the systems now prevailing, albeit by the construction of a still greater number of water-traps, which are a positive evil themselves by the effect of the fecal masses melting therein.

In the Nadieïn apparatus water flowing several times down the pipes is saturated with air, whereby the water in the houses is fairly disinfected.

Rain water may be utilized for the ventilation of houses and disinfection of house water.

The apparatus of the Nadieïn's System act as follows:

The water and excreta from the water-closet fall down the waste pipe *I* into the curved metal-plate *I*, "The Separator"; by the law of adhesion, the water runs off the plate into the trough *c*, whilst the feces fall into the receptable *P*. An automatic apparatus is arranged to disinfect the faces. The diagram shows this apparatus *H—r* for showering peat, earth, or cinders upon the excrement. The water from the trough *c* runs into a pail *v*, which is attached to one end of a lever *m*; the weight of the water lowers the pail, thus turning the drum *r* and causing the peat from the hopper *H* lying upon *r* to fall upon the feces in the receptacle *P*; the pail is then lifted to its former position by the counterweight *d*.

When the pail *v* descends, the chain *e* opens the valve *q* in the bottom of the pail *v*. The water falls through this valve into the large receptable *c'*, and flowing down the pipe *a* exhausts the air from the chamber *k* surrounding *a*, and draws down with it the gases from the water-closet by the small pipe *e*.

In the apparatus represented in Fig. 2 the [illegible] *the valve *q* and the bucket *v* are substituted by the spout *N—n* and the water wheel *M*, which sets in motion the drum *r* by the pression of the fluid flowing from the spout *C*. In Fig. 3, 4 and 5 this construction is shown on a larger scale (in two perspective views and one plan).*

In order to prevent any smell from the urinals, a syphon *K* (Nadieïn's system) is placed in them. When the water admitted into the urinal reaches a level high enough to cover the syphon, it overflows through the syphon either into the water-closet *C*, or into the waste pipe *I*, drawing down with it air through the small tube *i*, to aerate the water and urine flowing down the syphon.

The first diagram (Fig. 1) shows the apparatus under the house; the second (Fig. 2) shows that in the pit outside the house.

Letters should be addressed to:

M. P. NADIEIN, ESQ.,
Langham House, College Road, Harrow-on-the-Hill.

A. Lavatory, or sink basin.
H. Urinal basin.
B. Self-acting water-closet.
C. Ventilating pipe.
K. Syphon basin, Nadieïn B.
e f. Water and waste water pipes.
G. Waste pipes.
J. Ventilating pipe.
I. Small pipe to ventilate water-closet basin pipe from the roof.
M. Hopper for peat, length, with and without lid, 1 ft.
l. Drum, length, 1 ft., diam., 1 ft.
m. Lever, 11 meters.
n. Counterweight.
11. "The Separator" width 1 meter 20 centimeters.
12. Spreading of waste pipe.
c. Trough to receive water flown from "the separator" width, 1 ft., length 1 meter 1 ft.
c'. Room or trough, 6 feet 3 inches.
d. Counterweight.
e. Pail, 1 ft. in diam.; height 1 ft.
q. Valve, diam., 1 ft.
v. Larger receptacle, diam. 1 ft. 4 in.
P. Hopper to receive the separated feces covered with peat, length and breadth, 1 meter; height, 1 ft.
k. 1st hopper from which air is drawn by flowing water.
b. Basin Pipes.
5th Pit in the street.
a. Bent Pipes.
g. Syphon for closet of water from town sewer.
h. Town sewer.
B. Syphon, diam., 3/4 to 1 1/4 inches.

Syphons B by the line Y.C.; closet C by the line X.C.; urinal H by the line Y.U.; and ventilating pipe D by the line M.

For information concerning the purchase of the Patent please apply

NEW APPARATUS
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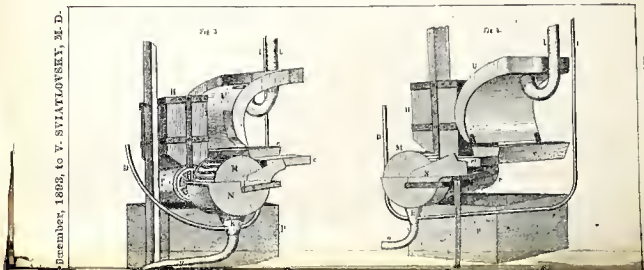
House and City Sanitation
AND ECONOMICAL CANALIZATION.

[PATENTED IN EUROPE AND AMERICA.]

System of M. NADIEIN, Captain of the Russian Army.



September, 1893, to V. SVIATOSTSKY, M. D.

All letters should be addressed to [illegible] of the RUSSIAN DEPT. of the World's Columbian Exposition.